# SPRINT

TECHNOLOGIE DIE OUDEREN BEWEEGT

S mart
P revention,
R ehabilitation &
IN tervention
T echnologies;

*Improved mobility & participation*

# Problems

- When (older) citizens cannot participate in society
  $\Rightarrow$ loss of independency, increased care
- Cause: physical, cognitive, stress, social, nutrition
- In NL, 140.000 elderly treated after a fall accident
- Direct + indirect costs: 700 M€/yr

- When (older) employees become incapacitated
  $\Rightarrow$ loss of expertise, increased care
- Cause: physical, cognitive, stress, social, nutrition
  disbalance between workload and -capacity
- In NL: 25% employees problems due to ageing
- Costs for companies, insurance, society: 8 G€/yr

# SPRINT Mission

## Four research lines

1. Monitoring systems to find (older) citizens @risk, both @home and @work
2. Interactive training programs and devices to prevent mobility loss @home and @work
3. Interactive training programs and devices for rehabilitation @home
4. Smart prostheses and orthoses, patient-driven

- Telemonitoring for control and feedback
- Serious gaming for increased motivation
- Behavior change for better implementation

# Participants

***Healthcare institutions***

- Beatrixoord, Groningen
- Roessingh Rehabilitation, Enschede
- Rehabilitation Friesland, Beetsterzwaag
- Rehabilitation Doorn
- St. Maartenskliniek, Nijmegen
- Fysiogym, Enschede
- Paramedisch Instituut Rembrandt, Veenendaal

***Industry***

- 2M Sensors, Veldhoven
- Ambroise, Enschede
- aXtion, Groningen
- Baat Engineering, Hengelo
- Bionicacentrum, Groningen
- BMA-ergonomics
- CGI Logica, Groningen
- Cinsol BV, Nijmegen
- Delft Prosthetics
- Demcon, Oldenzaal
- Dog-back, Groningen
- Durea, Drunen
- Eriks aandrijftechniek, Schoonhoven
- Eureva, Drachten
- Evocare, Hengelo
- Forcelink, Culemborg
- Grendel Games, Leeuwarden
- USGT, Opende
- IMDS, Roden
- Indes, Enschede
- KWIC, Groningen
- Lavoisier, Groningen
- Limis, Leeuwarden
- Lode, Groningen
- Madlogic, Groningen
- McRoberts, Den Haag
- Motek Medical, Amsterdam
- Motion Projects, Utrecht
- Negotica, Groningen
- OIM Orthopedie, Assen
- Össur, Son en Breugel, Reykjavik (IJsland)
- Otto Bock, Son en Breugel, Duderstadt (D)
- Personal Space Technologies, Amsterdam
- Peters Metaalbewerking BV, Wanroij
- Pezy, Groningen
- Philips Research, Personal Health Solutions
- PriHealth, Groningen
- QIConnect, Leidschendam
- Qserve, Amsterdam
- STT, Tolbert
- Technologies88, Leeuwarden
- Thuasne, Nijkerk
- Umaco, Groningen
- Veiligheid.nl
- Vita Care, Apeldoorn
- Vitalis, Drachten
- VitalinQ, Groningen
- VTEC Lasers & Sensors
- Xsens, Enschede
- Ynnovator, Groningen

# Public research groups

***Universities***

- UMCG (including:, departments of Rehabilitation Medicine, Orthopaedics, Human Movement Sciences, Neurology, Public Health)
- RUG (Departments of Operations (FEB) and Discrete Technology, Production Automation (FWN), Institute for Mathematics and Informatics (FWN), Psychology)
- UT (Departments of Biomechanical Engineering, Biomedical Signals & Systems, Design, Production and Management)
- HvG (Hanze University of Applied Sciences)
- NHL Hogeschool, GameAcademy

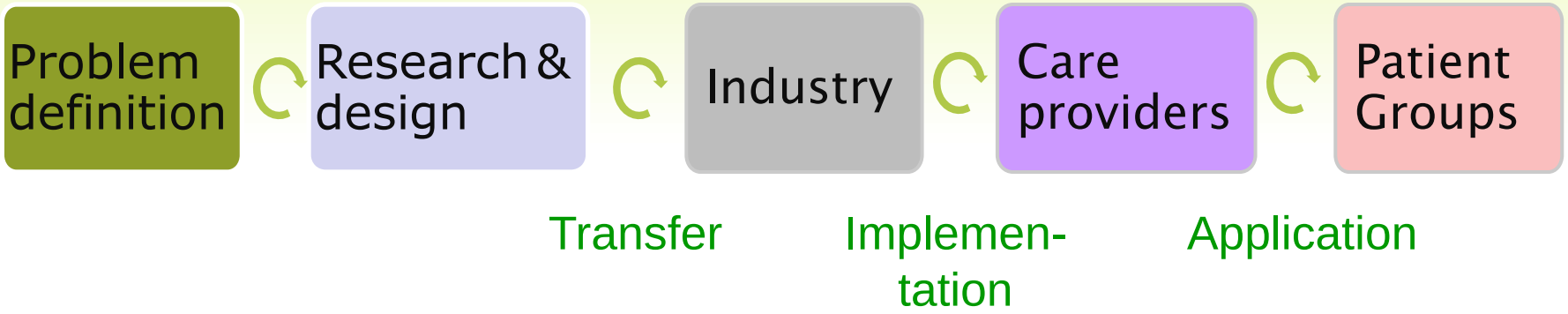
***Private research groups***

- INCAS$^3$, Assen
- Roessingh RRD, Enschede
- Waag Society Amsterdam

***Other***

- De Friesland (Health insurance)
- Achmea (Health insurance)
- Healthcare Innovation Forum, Groningen

# Development chain




## Strength of SPRINT:

- Performing all stages of the development chain
- Social innovation (including all stakeholders: industrial, user participation)

# Project strategy

- User-participation from t = 0
- Industrial participation from t = 0
- Industries and companies share researchers

# Results

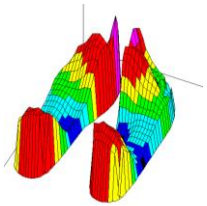
- 20 Running projects
- 17 PhD-students
- 1 Spin-off company
- 2 Patents
- Increase in staff of 20 fte
- Increased portfolio of industry

# Exergames for balance training

Serious Game

Training Aspects

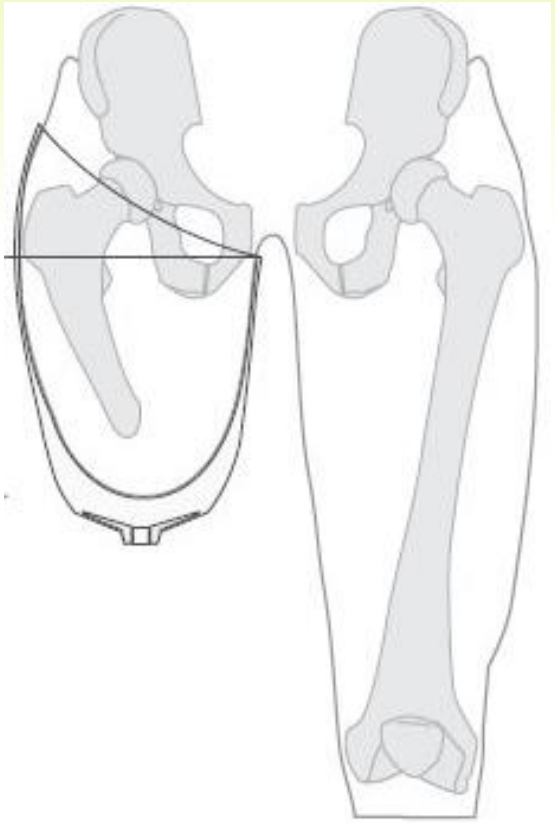
Parameters Balance Quantification



Sensor System

# Knee orthosis for cartilage repair

# Smart prostheses / orthoses



Improved fixation by osteo-integration

# Challenges

Prosthetic use unknown

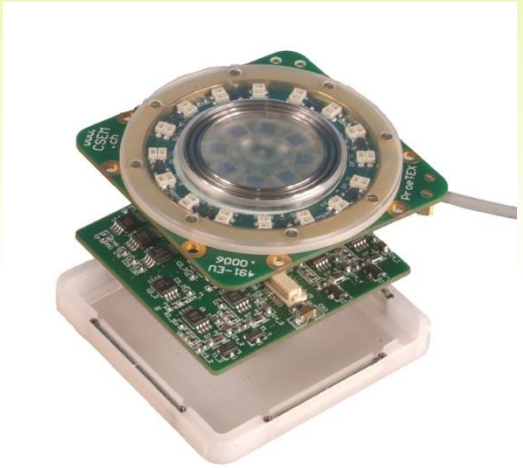
Required

- Sensor systems
- Telemonitoring
- Data-acquisition
- Feed-back
- Improvement of prostheses, fitting, manufacturing, instruction

# SPRINT@Work

- Monitoring physical, cognitive, mental, nutritional decline
  - Employees
  - Employers
  - Work content
  - Work environment

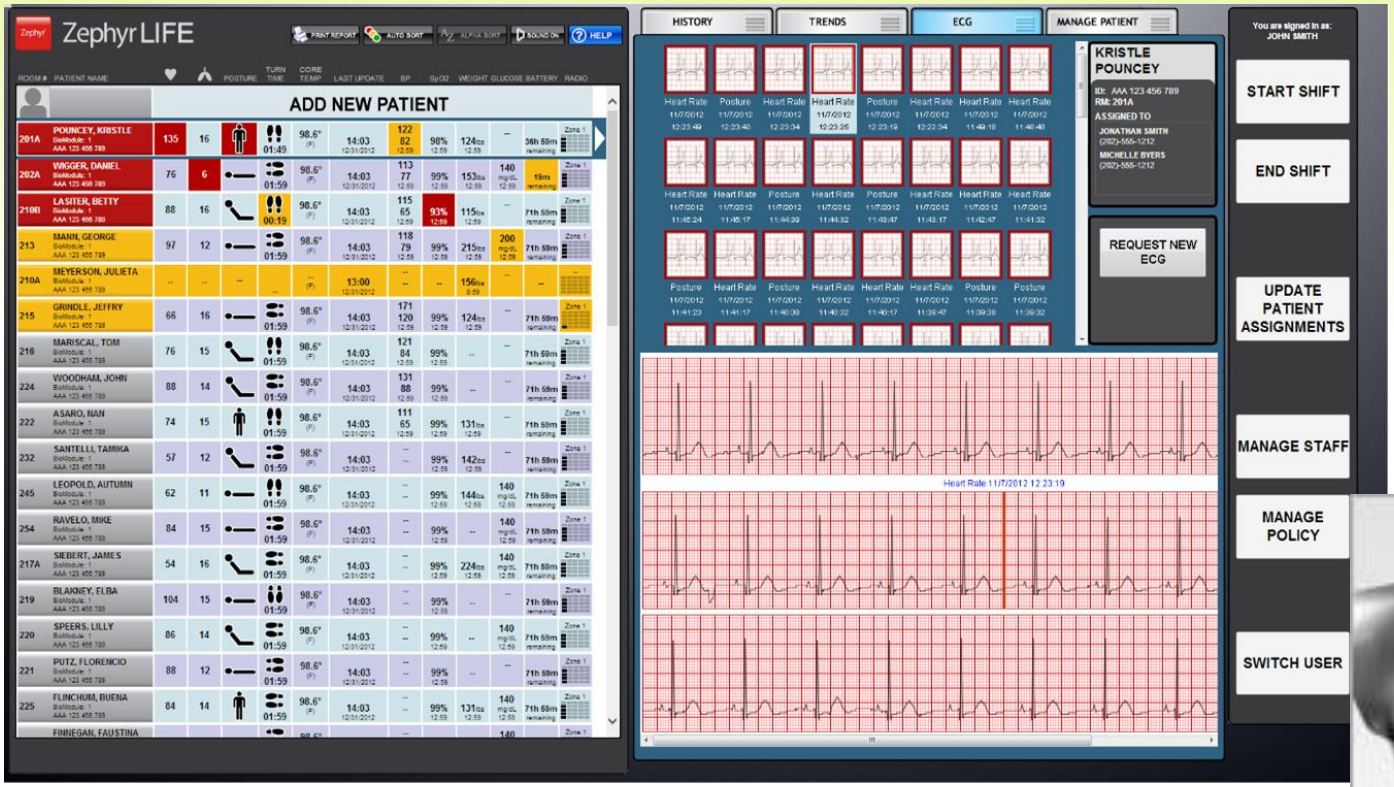
# Multi-parameter monitoring



Accuracy? Validity?

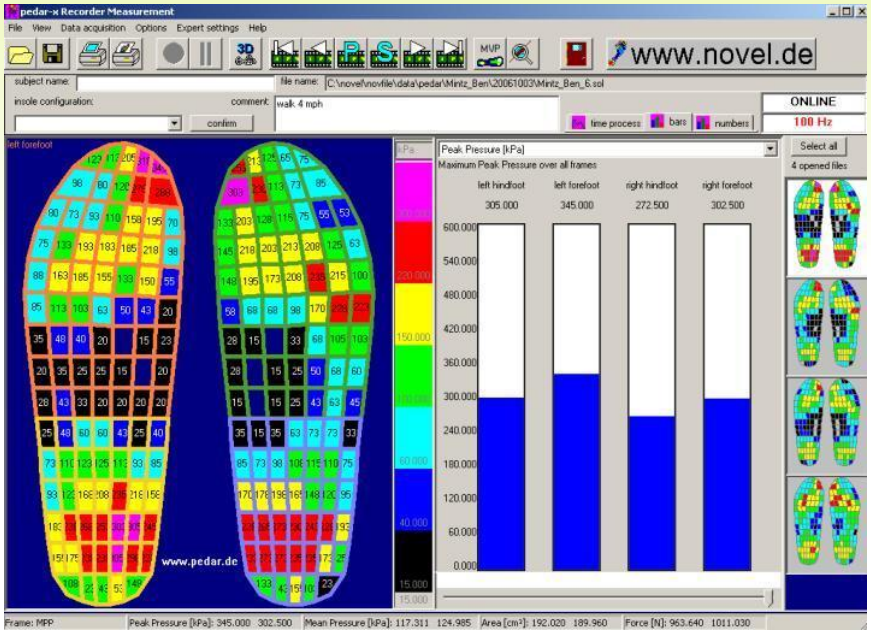
- ECG
- Blood pressure
- Respiration
- Core body temperature
- Pulse oxymetry
- Activity and posture

# Multi-parameter monitoring



Combining multi-parameters to one?

# Mechanical load - work posture

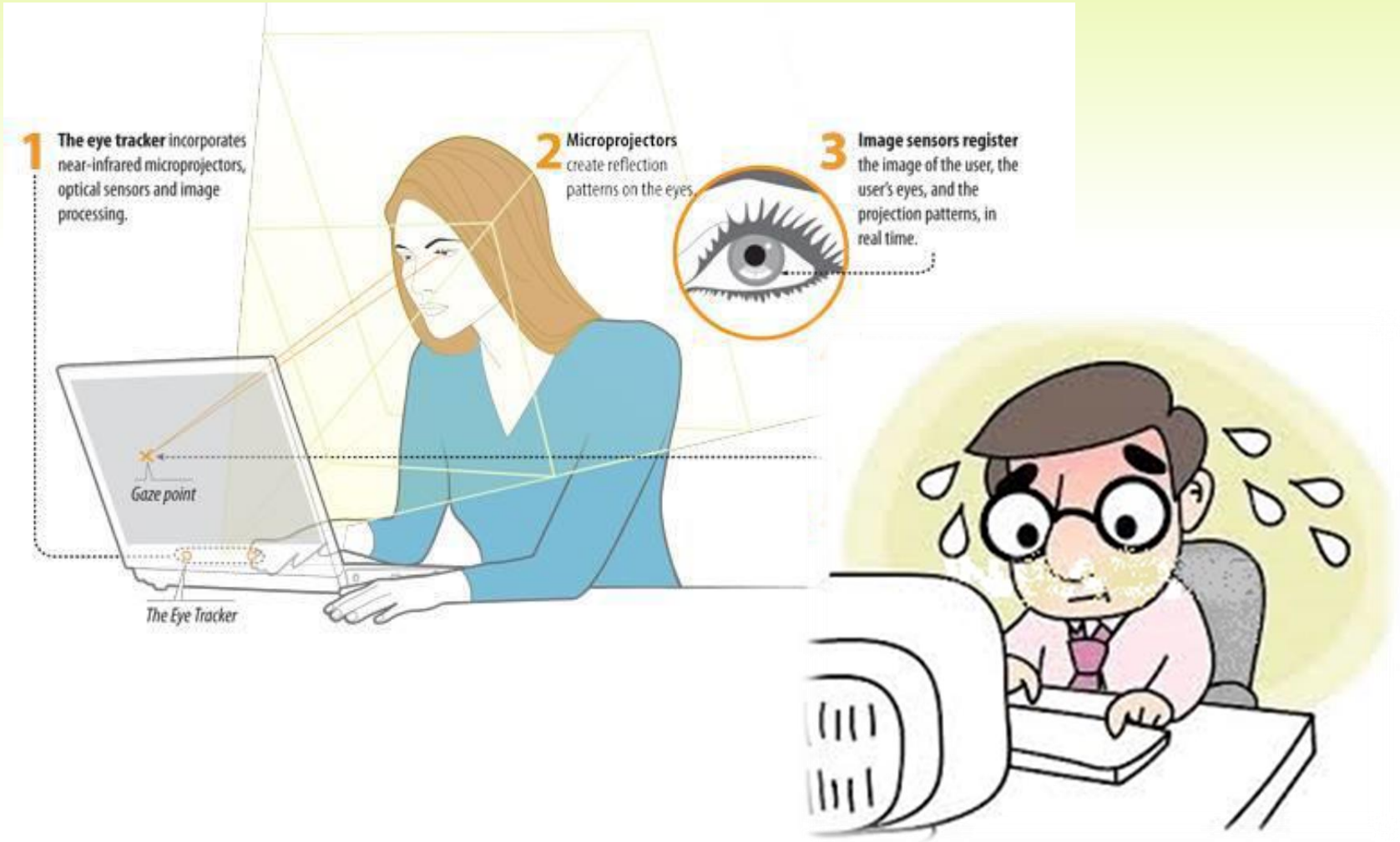


Segment modelling? Measuring load?

# Unobtrusive sensor systems

Monitoring physical, cognitive, mental, nutritional decline

# Cognitive load


1 The eye tracker incorporates near-infrared microprojectors, optical sensors and image processing.
2 Microprojectors create reflection patterns on the eyes.
3 Image sensors register the image of the user, the user's eyes, and the projection patterns, in real time.
Gaze point
The Eye Tracker

# SPRINT@Work

- Physical, cognitive, mental, nutritional compensatory or training interventions
  - Employees
  - Employers
  - Work content
  - Work environment

# Nutrition

Slanker Gezonder Superfit
inloggen | aanmelden
zoeken
Volgen
MinderKoolhydraten.nl
Home
KOOLHYDRATEN
RECEPTEN & MENU'S
TABEL
EETWIJZER
NIEUWS
VIDEO
FAQ
Contact
Genieten van eten met je hele gezin
nu ook
ONLINE
SUPPORT

# SPRINT

TECHNOLOGIE DIE OUDEREN BEWEEGT

Smart Prevention, Rehabilitation & INtervention Technologies;
*Improved mobility & participation*

*www.imdi-sprint.nl*

*Financial support* ZonMw SNN stw